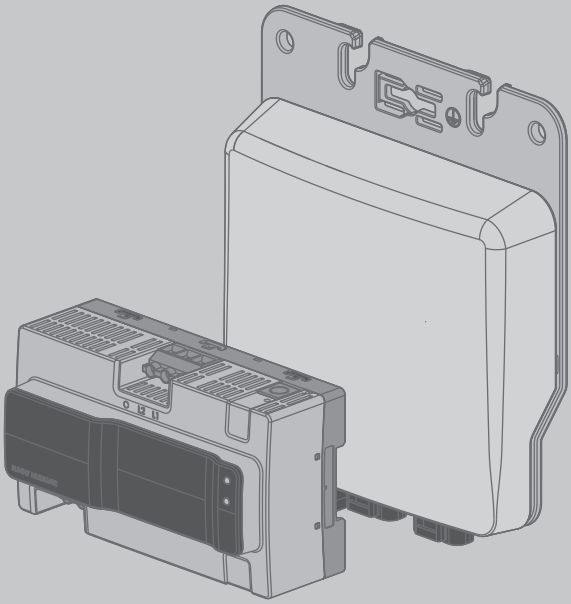
Installation Manual

SUNNY BOY 240
SUNNY MULTIGATE



SMA-SB240-IA-en-12 | Version 1.2

AMERICAN ENGLISH

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1 Information on this Document

1.1 Validity

This document is valid for the following device types:

- SB 240-10 (Sunny Boy 240)
- Multigate-10 (Sunny Multigate)

1.2 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of and compliance with this document and all safety precautions

1.3 Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document title	Document type
"Micro Inverters in Sunny Portal" Monitoring and Visualization of Micro Inverters in Sunny Portal	User Manual
"Sunny Explorer" Software for Visualizing and Administrating a Speedwire System	User Manual
"Circuit Breaker" Dimensioning and Selection of a Suitable AC Circuit Breaker for Inverters under PV-Specific Influences	Technical Information
"Criteria for Selecting a Residual-Current Device"	Technical Information
"Order Form for the SMA Grid Guard Code"	Certificate

1.4 Symbols

Symbol	Explanation
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, can result in death or serious injury

Symbol	Explanation
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

1.5 Nomenclature

Complete designation	Designation in this document
Sunny Boy	Inverter, micro inverter, product
Sunny Multigate	Product
SMA Speedwire	Speedwire
Inverter which is located at the beginning of the PV system and directly connected to the Sunny Multigate via the AC cable and the AC field plug	First inverter
Inverter which is located at the end of the PV system and not directly connected to the Sunny Multigate	Last inverter
Industrial enclosure, sub-distribution, switch cabinet or meter box	Distribution box

2 Safety

2.1 Intended Use

Sunny Boy 240

The Sunny Boy is a micro inverter for PV systems that converts the direct current from a PV module into grid-compliant alternating current. The alternating current generated is fed into the utility grid via the Sunny Multigate.

The product is suitable for indoor and outdoor use.

The Sunny Boy must only be connected to one PV module. The PV module used must comply with protection class II as per IEC 61730, application class A and must be compatible for use with the Sunny Boy. The Sunny Boy must be operated with the Sunny Multigate.

- Do not connect any loads between the Sunny Boy and the Sunny Multigate.
- Do not connect any loads between the individual Sunny Boy inverters.
- Do not open the lid of the Sunny Boy.
- Only mount the Sunny Boy on the framework mounted on the roof directly under the PV modules or on the wall.
- Do not mount the Sunny Boy directly on the module frame.
- Do not mount the Sunny Boy on flammable construction materials.
- Do not mount the Sunny Boy in areas containing highly flammable materials.
- Do not mount the Sunny Boy in potentially explosive atmospheres.

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and usually void the operation permit. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

The type label must remain permanently attached to the product.

Sunny Multigate

The Sunny Multigate is a communication unit and forms the electrical connection point of the PV system with a maximum of twelve micro inverters to the utility grid. The Sunny Multigate is equipped with an integrated disconnection point for grid monitoring. The Sunny Multigate is connected between the micro inverters and the utility grid to feed the alternating current of the micro inverters collectively into the utility grid.

The product is designed for indoor use only.

The Sunny Multigate must be installed and operated in a distribution box.

- A maximum of twelve micro inverters can be connected to the Sunny Multigate.
- No loads must be connected between the Sunny Boy and the Sunny Multigate.
- No loads must be connected between the Sunny Multigate and the circuit breaker.
- The grounding conductor of the AC cable from the inverter must be connected to the Sunny Multigate.
- The grounding conductor of the Sunny Multigate must be connected to the equipotential bonding of the AC distribution board.
- The Sunny Multigate must not be opened.

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and usually void the operation permit. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

The type label must remain permanently attached to the product.

2.2 Safety Information

This section contains safety information that must be observed at all times when working on or with the product.

To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

⚠ DANGER

Danger to life due to high voltages of the PV modules

When exposed to sunlight, the PV modules generate dangerous DC voltage which is present in the DC conductors. Touching the DC conductors can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not open the inverter and the Sunny Multigate.
- Disconnect the inverter from all voltage sources before performing any work on it (see Section 9, page 48).
- Before working on the Sunny Multigate, always disconnect it from all voltage sources (see Section 10, page 50).
- Follow the instructions precisely.
- Observe the warning messages on the inverter and the Sunny Multigate.

⚠ DANGER

Risk of electric shock due to ground fault

If a ground fault occurs, parts of the system may still be live. Touching live components can lead to lethal electric shocks.

- Prior to touching any components, always disconnect the inverter from all voltage sources as described in this document (see Section 9, page 48).
- Prior to touching any components, always disconnect the Sunny Multigate from all voltage sources as described in this document (see Section 10, page 50).

⚠ DANGER

Risk of electric shock due to damaged devices

Operating a damaged inverter or Sunny Multigate can lead to hazardous situations that result in lethal electric shocks.

- Only operate the inverter and the Sunny Multigate provided that they are in safe and full working order.
- Regularly check for visible damage.

⚠ WARNING

Risk of burns due to hot surfaces

The surfaces of the inverter and the Sunny Multigate can get very hot. Touching the surface can result in burns.

- Mount the inverter in such a way that it cannot be touched inadvertently.
- Do not touch hot surfaces.
- Wait ten minutes for the surface to cool sufficiently before performing any work on the inverter.
- Observe the warning messages on the inverter and the Sunny Multigate.

NOTICE

Damage to the inverter due to moisture and dust intrusion

Dust or moisture intrusion can damage the inverter and impair its functionality.

- Seal all inverter pin connectors with the appropriate plugs or protective caps.

NOTICE

Damage to the Sunny Multigate due to the use of cleaning agents

The use of cleaning agents may cause damage to components of the Sunny Multigate. If the Sunny Multigate is dirty or dusty, you can clean the enclosure, the ventilation slots, the type label, and the LEDs with a dry brush.

- Disconnect the Sunny Multigate from all voltage sources (see Section 10, page 50).
- Only clean the Sunny Multigate with a dry brush.

NOTICE

Damage to the inverter due to the use of cleaning agents

- If the inverter is dirty, clean the enclosure, the enclosure lid and the type label only using clear water and a cloth.

3 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

Sunny Boy

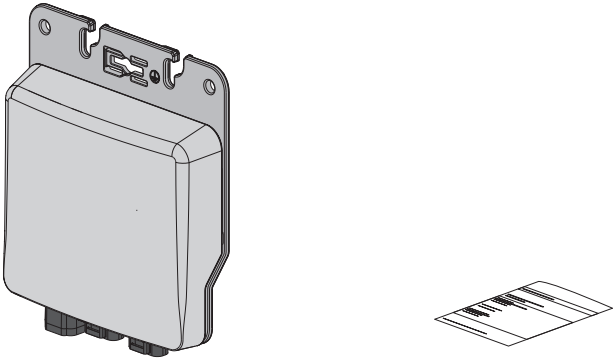


Figure 1: Components included in the scope of delivery of the inverter

Position	Quantity	Designation
A	1	Inverter
B	1	Supplementary sheet for the inverter

Sunny Multigate

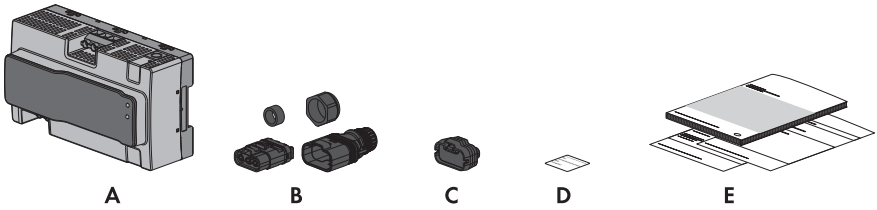


Figure 2: Elements included in the scope of delivery of the Sunny Multigate

Position	Quantity	Designation
A	1	Sunny Multigate
B	1	AC field plug: insulator, plug enclosure, seal, screw connection
C	1	Protective cap for unused AC pin connector on the last inverter*

Position	Quantity	Designation
D	1	Label with registration ID (RID) and identification key (PIC) for registration in Sunny Portal**
E	1	Installation manual for Sunny Boy and Sunny Multigate, mounting overview, supplementary sheet with default settings

* Last inverter: The inverter that is located at the end of the PV system and not directly connected to the Sunny Multigate but only to one other inverter, is called the "last inverter" in this document. An AC pin connector remains unused on the last inverter and must be closed with a protective cap.

** Keep this label with your access data for registration in Sunny Portal. The access data can be found on the Sunny Multigate type label.

AC Cable and DC Plug



Figure 3: Components included in the scope of delivery of the AC cable and the DC plug

Position	Quantity	Designation
A	1	AC cable with two connectors for connecting two inverters or for connecting the first inverter* to the AC field plug
B	1	DC plug with two DC connectors**

* First inverter: The inverter that is located at the beginning of the PV system and is directly connected to the Sunny Multigate via the AC cable is called "first inverter" in this document.

** The DC connectors illustrated may deviate from your order.

4 Product Description

4.1 Sunny Boy

The Sunny Boy is a micro inverter for PV systems that converts the direct current from a PV module into grid-compliant alternating current. The alternating current generated is fed into the utility grid via the Sunny Multigate.

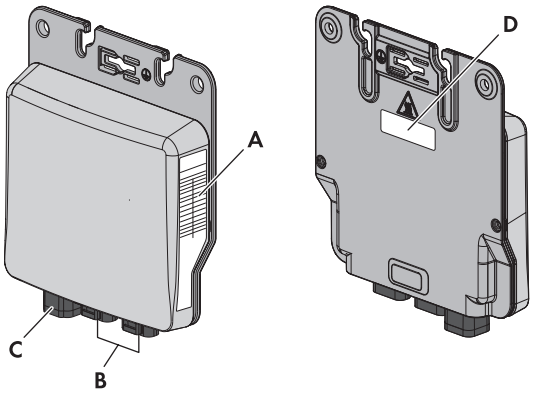


Figure 4: Design of the Sunny Boy

Position	Explanation
A	Type label The type label uniquely identifies the inverter. You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No.) • Date of manufacture • Device-specific characteristics
B	Pin connectors for the AC connectors
C	Pin connector for DC plug
D	Removable label with inverter serial number To enable clear identification of the inverters of a PV system, e.g. under fault conditions, this label can be applied to the enclosed mounting overview.

4.2 Sunny Multigate

The Sunny Multigate is a communication unit and forms the electrical connection point of the PV system with a maximum of twelve micro inverters to the utility grid. The Sunny Multigate is equipped with an integrated disconnection point for grid monitoring. The Sunny Multigate is connected between the micro inverters and the utility grid to feed the alternating current of the micro inverters collectively into the utility grid.

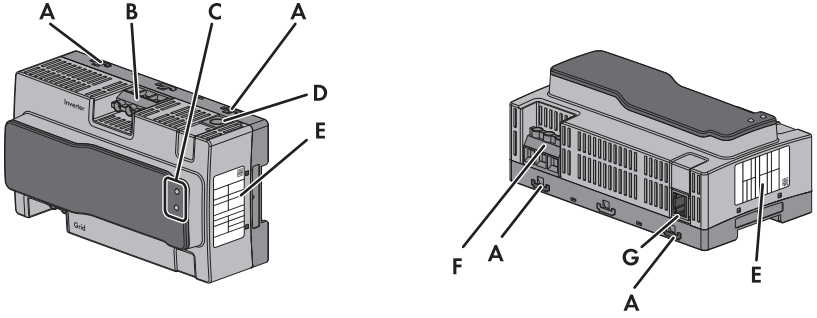


Figure 5: Design of the Sunny Multigate

Position	Explanation
A	Press-out brackets for mounting with screws
B	Screw terminal for AC input (inverter) Labeling: Inverter
C	LEDs The upper LED indicates the operating state of the inverters. The lower LED indicates the operating state of the Sunny Multigate. Depending on the operating state, the LEDs are glowing green, red or orange, or are off (see Section 4.3 "LED Signals", page 16).
D	Interface for optional communication
E	The type label provides a clear identification of the Sunny Multigate. You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No.) • Registration ID (RID) for registration in Sunny Portal • Identification key (PIC) for registration in Sunny Portal • Device-specific characteristics

Position	Explanation
F	Screw terminal for AC output (utility grid) Labeling: Grid
G	Pin connector for connecting the network cable (RJ45)

4.3 LED Signals

The LEDs on the Sunny Multigate indicate the operating state of the PV system.

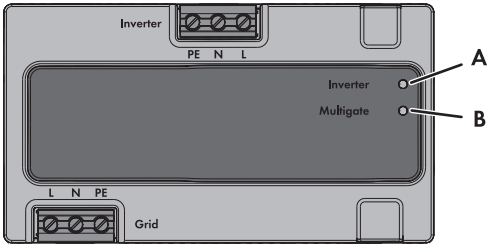


Figure 6: Position of the LEDs on the Sunny Multigate

The upper LED is labeled with **Inverter** and indicates the operating state of the inverters.
The lower LED is labeled with **Multigate** and indicates the operating state of the Sunny Multigate.

LED	Status	Explanation
A: LED **Inverter**	off	The communication with the inverters is not active.
	glowing green	The inverters are in operation.
	glowing orange	At least one of the connected inverters is in **Warning** mode. You will find the detailed error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document (see Section 11 "Troubleshooting", page 51).
	glowing red	At least one of the connected inverters is in **Fault** mode. You will find the detailed error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document (see Section 11 "Troubleshooting", page 51).

LED	Status	Explanation
B: LED **Multigate**	off	Either there is no AC voltage present or the Sunny Multigate is defective.
	glowing green	The Sunny Multigate is in normal operating state.
	glowing orange	The Sunny Multigate is in **Warning** mode. 1. If communication is still possible, determine the respective error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document (see Section 11 "Troubleshooting", page 51). 2. If no communication is possible, disconnect the network cable from the Sunny Multigate and reconnect the Sunny Multigate to the network (see Section 8.2 "Connecting the Sunny Multigate to the Network", page 44). 3. If the error persists, disconnect the Sunny Multigate from all voltage sources (see Section 10 "Disconnecting the Sunny Multigate from Voltage Sources", page 50) and reconnect it (see Section 6.7 "Connecting the Sunny Multigate to the Utility Grid", page 39). 4. If the error persists, contact the SMA Service Line.
	glowing red	The Sunny Multigate is in **Fault** mode. 1. If communication is still possible, determine the respective error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document (see Section 11 "Troubleshooting", page 51). 2. If no communication is possible, disconnect the network cable from the Sunny Multigate and reconnect the Sunny Multigate to the network (see Section 8.2 "Connecting the Sunny Multigate to the Network", page 44). 3. If the error persists, disconnect the Sunny Multigate from all voltage sources (see Section 10 "Disconnecting the Sunny Multigate from Voltage Sources", page 50) and reconnect it (see Section 6.7 "Connecting the Sunny Multigate to the Utility Grid", page 39). 4. If the error persists, contact the SMA Service Line.

4.4 Symbols on Products

Symbol	Explanation
	Grounding conductor This symbol indicates the position for the grounding conductor terminal.
	DC load-break switch The DC plug on the inverter has the function of a DC load-break switch.
	Danger to life due to high voltages The product operates at high voltages. All work on the product must be carried out by qualified persons only.
	Risk of burns due to hot surfaces The product can get hot during operation. Avoid contact during operation. Allow the product to cool down sufficiently before carrying out any work. Wear personal protective equipment such as safety gloves.
	Observe the documentation. Observe all documentation supplied with the product.
	CE marking The product complies with the requirements of the applicable EU directives.
	VDE certification mark The product is VDE-tested and complies with the current health and safety requirements.
	Certified safety The product is VDE-tested and complies with the current health and safety requirements.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the locally applicable disposal regulations for electronic waste.

4.5 Communication

Communication between Inverter and Sunny Multigate

The inverter is connected to the Sunny Multigate via the AC cable. The communication and data transmission between the Sunny Multigate and the inverters takes place via a PLC interface.

Communication between Sunny Multigate and Other Communication Products

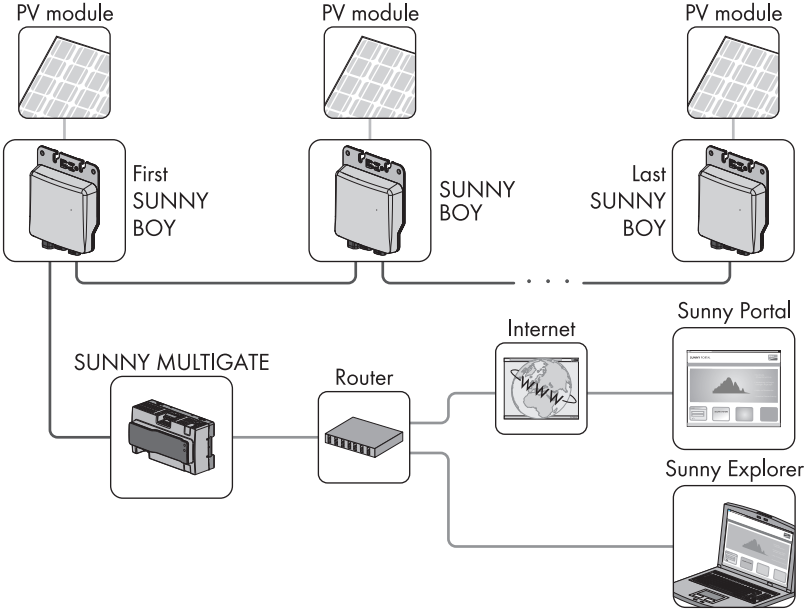


Figure 7: Example of a PV system with micro inverters and Sunny Multigate with communication via Speedwire/ Webconnect

Communication between the Sunny Multigate and other SMA communication products (e.g. Sunny Explorer, Sunny Portal) takes place via Speedwire/Webconnect. Speedwire is a type of communication based on Ethernet. You can connect the Sunny Multigate to your network via Speedwire. Webconnect enables data exchange between Sunny Multigate and Sunny Portal. In order to establish a connection to Sunny Portal, the Sunny Multigate must be connected to a router or modem with Internet connection and be integrated into the local network. To enable data exchange between Sunny Multigate and Sunny Portal, you must register the PV system in Sunny Portal (see Section 8.3 "Registering the Sunny Multigate in Sunny Portal", page 45). If you do not want to use the Webconnect function, you can deactivate it in Sunny Explorer (see Section 8.7 "Deactivating the Webconnect Function", page 47).

5 Mounting

5.1 Requirements for Mounting the Inverter

Requirements for the mounting location:

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fires.

- Do not mount the inverter in areas containing highly flammable materials or gases.
- Do not mount the inverter in a potentially explosive atmosphere.

⚠ WARNING

Risk of burns due to hot surfaces

The surface of the inverter can get very hot. Touching the surface can result in burns.

- Mount the inverter in such a way that it cannot be touched inadvertently.
- Do not touch hot surfaces.
- Wait ten minutes for the surface to cool sufficiently before performing any work on the inverter.
- Observe the warning messages on the inverter.

☐ To ensure optimum operation, the ambient temperature should be between -40°C and 65°C.

☐ The mounting location should not be exposed to direct solar irradiation. Direct solar irradiation can cause the inverter to overheat. As a result, the inverter reduces its power output.

☐ Climatic conditions must be met (see Section 14 "Technical Data", page 66).

☐ The mounting location must be inaccessible to children.

☐ The mounting location must be suitable for the weight and dimensions of the inverter (see Section 14 "Technical Data", page 66).

☐ The inverter must be mounted on the roof on the framework underneath the PV modules or on a solid support surface (e.g. concrete, brickwork). In living areas, ensure that the support surface is not drywall or similar. When in operation, the inverter makes noises which can be perceived as a nuisance.

☐ When mounting on the framework, the mounting position should preferably be in the center of the PV module. This will ensure a longer electrical endurance of the inverter.

Dimensions for mounting:

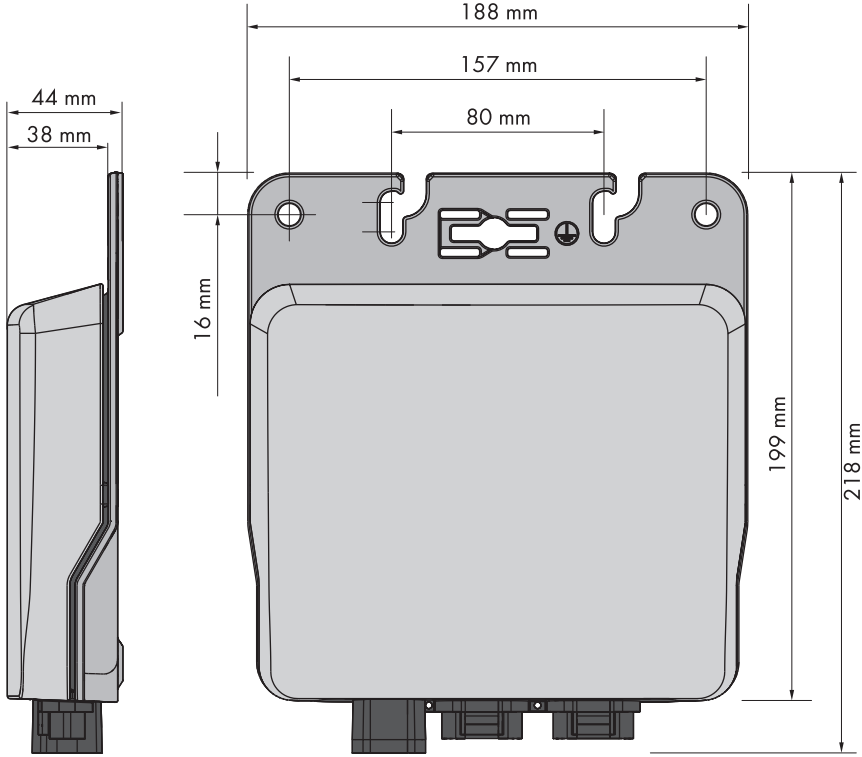


Figure 8: Position of the anchoring points

Recommended clearances:

- ☐ When using an AC cable of 1.40 m: min. 50 mm to max. 1.10 m
- ☐ When using an AC cable of 2.0 m: min. 50 mm to max. 1.70 m
- ☐ Greater distances between two inverters can be bridged using an additional cable and two AC field plugs (see Section 6.4 "Assembling the AC Field Plug", page 33).
- ☐ Observe recommended clearances to the inverters or other objects.

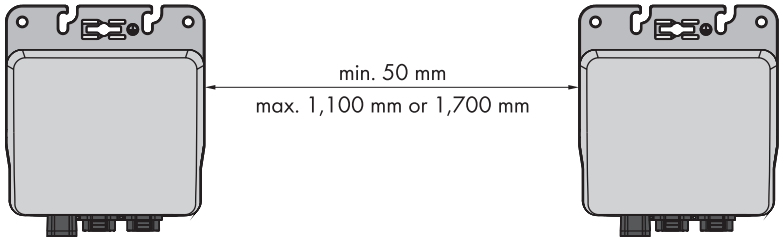


Figure 9: Recommended clearances

Minimum Clearance between Inverter and PV Module Bottom Side:

NOTICE

Damage to the PV module due to insufficient clearance between the inverter and the PV module bottom side

For roof mounting, the clearance from the inverter to the bottom side of the PV module must be at least 30 mm. This will prevent the grounding bolt from damaging the PV module.

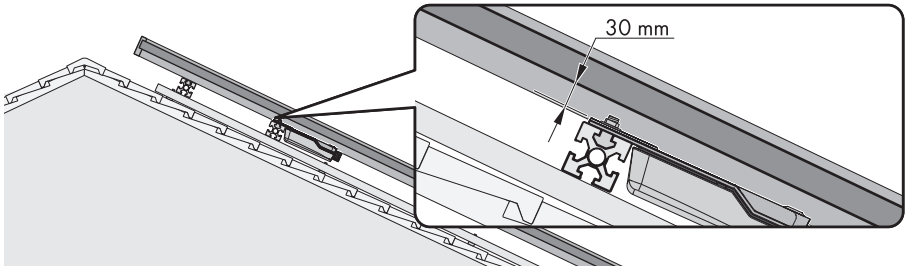


Figure 10: Minimum clearance of the inverter to the bottom side of the PV module

Permitted Mounting Position:

⚠ DANGER

Electric shock due to ingress of moisture

- During mounting, make sure that the connection area of the inverter remains dry. As soon as the connector and protective cap are plugged in, the connection area will be protected from moisture ingress. Thus, the inverter complies with degree of protection IP65.

☐ In order to ensure optimum operation and long electrical endurance of the inverter, install each inverter centered under the respective connection socket of the PV module.

☐ For installations that are integrated into the building, do not install the inverter directly on the back side of the PV module. This will prevent the inverter power from being reduced due to excessive ambient temperature.

5.2 Mounting the Inverter

5.2.1 Mounting the Inverter on the Roof

⚠ WARNING

Risk of falling when working on the roof

There is a risk of falling or slipping when working on the rooftop. Observe the applicable accident prevention regulations for work on rooftops.

- Before stepping on the rooftop, ensure the load bearing capacity of all parts subjected to load.
- In accordance with the accident prevention regulations, a safety harness must be worn or a safety scaffold must be used.
- Use a fall protection.

When mounting the inverter on the roof underneath the PV modules, proceed as follows.

You can mount the inverter with the back panel or with the enclosure lid to the roof. SMA Solar Technology AG recommends mounting the inverter with the enclosure lid to the roof. This will allow for better heat dissipation. Observe the minimum clearance of the inverter to the PV module (see Section 5.1 "Requirements for Mounting the Inverter", page 20).

i Information on the figures in this section

The figures show the recommended mounting option for the inverter with the lid facing the roof. The procedure for mounting the inverter with the back panel facing the roof is identical and is not depicted in the figures in this section.

i Position of the inverter

In order to ensure optimum operation and long electrical endurance of the inverter, install each inverter centered under the respective junction box of the PV module.

Additionally required mounting material (not included in the scope of delivery):

- ☐ The required fastening material must be selected according to the profile rail used.
- ☐ The mounting material must be made of stainless steel.
- ☐ Diameter of the screws: maximum 8 mm

NOTICE

Damage to the PV module due to screws being too long

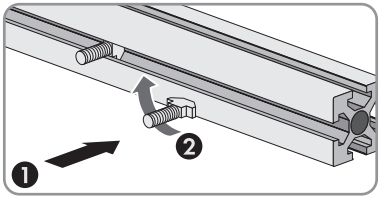
The length of the screws must be suitable for the clearance between the inverter and the PV module bottom side.

- Make sure that the PV module is not damaged by the screws being used.

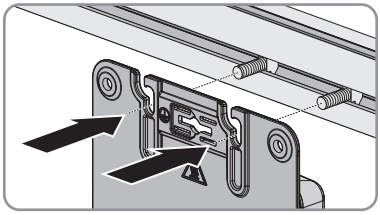
There are several options for attaching the inverter to the framework on the roof. In the following example, mounting with T-head bolts is described.

Procedure:

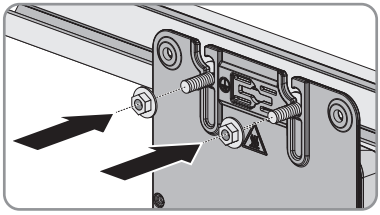
1. Keep the supplied mounting overview at hand for the allocation of the inverters to the PV modules.
2. In case the connection area points upwards during mounting, make sure to protect the plugs and pin connectors against ingress of moisture.
3. Remove the label with the inverter serial number from the inverter and attach it to the corresponding position in the mounting overview included in the delivery.
4. Insert the T-head bolts into the profile rail and turn by 90°. This will firmly anchor the screws in the profile rail.



5. Position the inverter on the anchored screws. Insert the screws into the oblong holes in the enclosure as far as the required fastening point.



6. Attach the inverter using suitable washers and nuts.



7. Ensure that the inverter is securely in place.

5.2.2 Mounting the Inverter on the Wall

To mount the inverter on the wall, proceed as follows.

Additionally required mounting material (not included in the scope of delivery):

- ☐ The mounting material must be made of stainless steel.
- ☐ Two screws suitable for the support surface
- ☐ Two washers suitable for the screws
- ☐ Two screw anchors suitable for the support surface and the screws

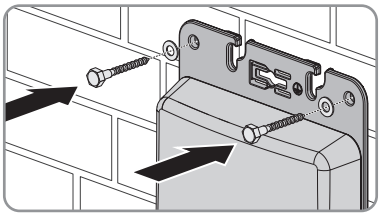
Procedure:

1. ⚠ CAUTION

   Risk of injury due to damaged cables

   There may be power lines or other supply lines (e.g. gas or water) routed in the wall.

   - Ensure that no lines are laid in the wall which could be damaged when drilling holes.
2. Mark the position of the drill holes using the holes in the enclosure. For this, use the two outer holes or the two oblong holes in the middle.
3. Drill the holes and insert the screw anchors.
4. Align the inverter with the drill holes and attach it using suitable screws and washers.



5.3 Requirements for Mounting the Sunny Multigate

Requirements for the mounting location:

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fires.

- Do not mount the Sunny Multigate in areas containing highly flammable materials or gases.
- Do not mount the Sunny Multigate in potentially explosive atmospheres.

⚠ WARNING

Danger of fire due to missing external enclosure

The Sunny Multigate is only protected against fire if it is installed in a distribution box. Otherwise, the fire risk could lead to personal injury and property damage.

- Only mount the Sunny Multigate in a distribution box.

NOTICE

Damage to the Sunny Multigate from moisture and dust intrusion

Dust or moisture intrusion can damage the Sunny Multigate and impair its functionality. The Sunny Multigate complies with degree of protection IP20 and must always be installed in a distribution box. This ensures that the Sunny Multigate is protected against dust and moisture.

- Only mount the Sunny Multigate in a distribution box.

- ☐ The mounting location must be suitable for the installation of the Sunny Multigate in a distribution box.
- ☐ The mounting location must be suitable for the weight and dimensions of the Sunny Multigate (see Section 14 "Technical Data", page 66).
- ☐ The mounting location must be inaccessible to children.
- ☐ AC cable route of the entire PV system with Sunny Multigate: maximum 30 m
  When installing several Sunny Multigate devices in a PV system, you must lay the AC cable of each Sunny Multigate to the respective inverter separately in order to guarantee trouble-free communication between the Sunny Multigate and the inverter.

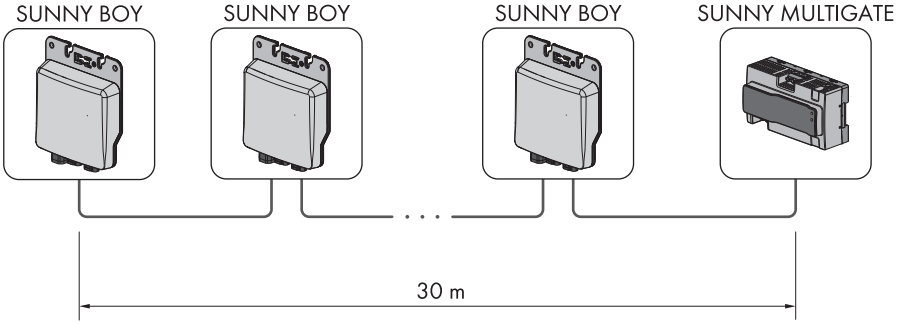


Figure 11: Maximum AC cable route of the PV system (left: last inverter; right: first inverter connected to Sunny Multigate).

- ☐ A robust support surface must be available for mounting the device, e.g. concrete, walls. In living areas, ensure that the support surface is not drywall or similar.
- ☐ The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.
- ☐ The mounting location should not be exposed to direct solar irradiation.
- ☐ Climatic conditions must be met (see Section 14 "Technical Data", page 66).
- ☐ The ambient temperature must be between -40°C and 25°C. This will ensure optimal operation of the Sunny Multigate.

Clearances:

- ☐ The clearance inside a metal distribution box must be at least 12.7 mm to walls or other components.
- ☐ Within an industrial closure, observe the following clearances to ensure sufficient ventilation:

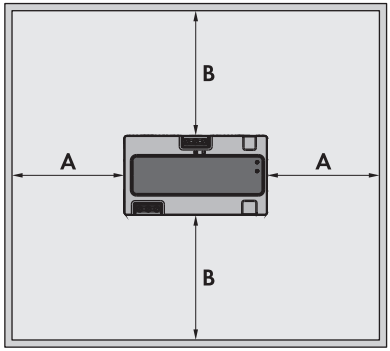


Figure 12: Recommended clearances

Position	Dimensions
A	98 mm
B	150 mm

Permitted mounting positions of the Sunny Multigate:

☐ Only mount the Sunny Multigate horizontally.

Dimensions for mounting the Sunny Multigate with screws:

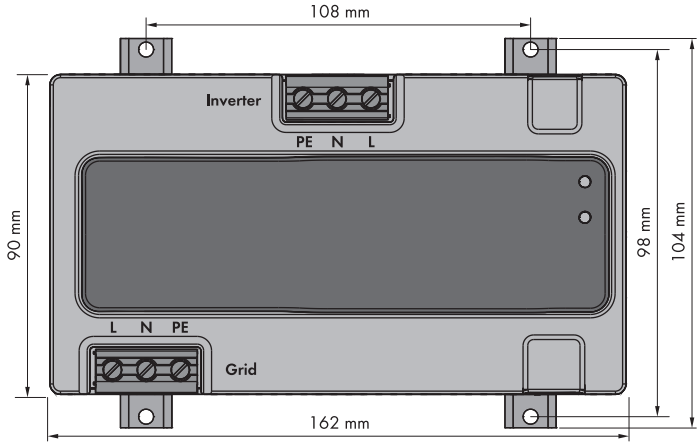


Figure 13: Dimensions of the Sunny Multigate and the drill holes for mounting with screws

5.4 Mounting the Sunny Multigate

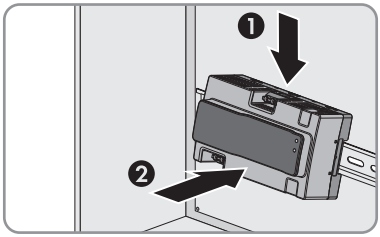
5.4.1 Mounting the Sunny Multigate on the Top-Hat Rail

Additionally required mounting material (not included in the scope of delivery):

- ☐ Distribution box complying with the installation site requirements according to degree of protection IP20
- ☐ Top-hat rail (DIN rail) suitable for the distribution box (width: 35 mm, length: 235 mm).

Procedure:

1. For mounting on a top-hat rail, attach the Sunny Multigate to the top-hat rail from above, and hook it in.



   ☑ The Sunny Multigate snaps into place.
2. Make sure that the Sunny Multigate is securely in place.

5.4.2 Mounting the Sunny Multigate on the Wall

Additionally required mounting material (not included in the scope of delivery):

- ☐ Distribution box complying with the installation site requirements according to degree of protection IP20
- ☐ Four screws suitable for the size of the press-out brackets of the Sunny Multigate and for the material of the distribution box. The maximum permissible height of the screw head of 6 mm must not be exceeded.

Procedure:

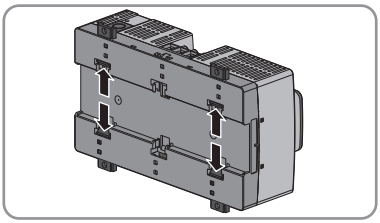
1. **⚠ WARNING**

   Danger to life due to electric shock

   If screws or conductors on the connecting terminal plate are touched, there is a risk of electric shock.

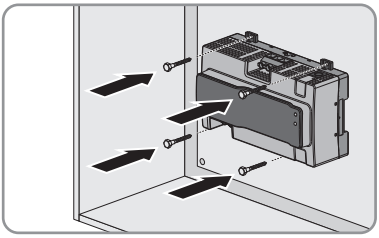
   - To avoid contact between screw and conductor, only use screws with a maximum head height of 6 mm for mounting on the brackets.

2. Press the four brackets on the back side of the Sunny Multigate out from the inside.



☑ The brackets snap audibly into place.

3. Mark the drill holes using the brackets as a template.
4. Drill the holes.
5. Insert screws with a maximum head height of 6 mm through the brackets and tighten. Make sure not to damage the brackets.



6. Make sure that the Sunny Multigate is securely in place.

6 Electrical Connection

6.1 Safety during Electrical Connection

⚠ DANGER

Risk of electric shock due to contact with live components when opening the Sunny Multigate

There are live components inside the Sunny Multigate. There is a risk of electric shock if you open the Sunny Multigate.

- **Never** open the Sunny Multigate.

NOTICE

Damage to the inverter due to moisture ingress

When the inverter is open, moisture can penetrate and cause damage to the inverter. The tightness is no longer intact and the function of the inverter cannot be guaranteed.

- **Never** open the inverter.

6.2 Overview of the Connection Areas

6.2.1 Sunny Boy

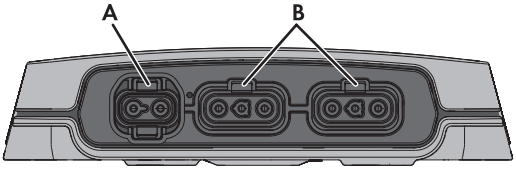


Figure 14: Connection areas at the bottom of the inverter

Position	Designation	Explanation
A	DC pin connector	Terminal for the DC plug
B	AC pin connector	• For AC cable connection for connecting two inverters • For connecting the first inverter to the Sunny Multigate • For inserting the protective cap on the last inverter

i Security seal

The unused AC pin connector must be sealed in some countries. The protective caps must be plugged into the middle AC pin connector since it is the only one having eyelets for security seal.

6.2.2 Sunny Multigate

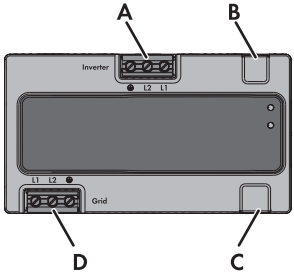


Figure 15: Connection areas on the Sunny Multigate

Position	Designation
A	Connecting terminal plate for the connection of the AC cable of the inverter, labeling: **Inverter**
B	Pin connector for connecting the optional communication
C	Pin connector for connecting the network cable (RJ45)
D	Connecting terminal plate for the connection of the AC cable of the utility grid, labeling: **Grid**

6.3 AC Cabling of the Inverters

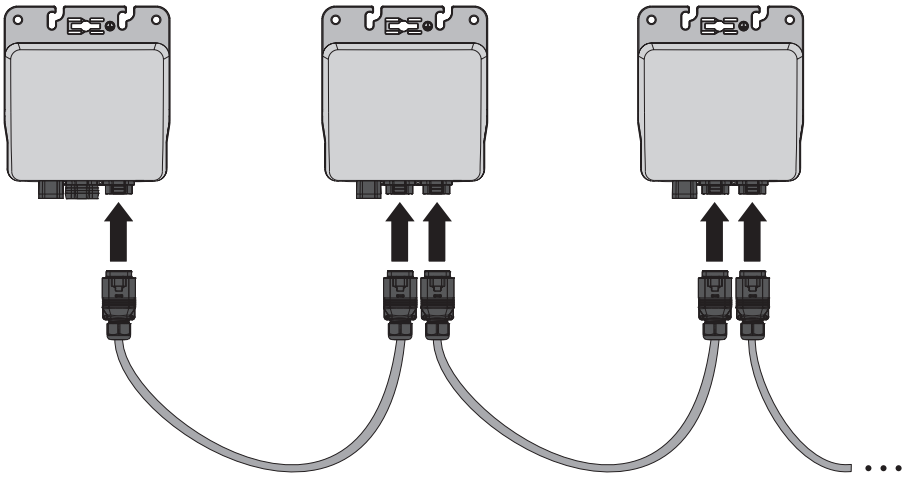


Figure 16: AC cabling among the inverters (left = last inverter; right = first inverter)

Requirements:

☐ For fusing purposes, use at maximum a 16 A circuit breaker.

☐ No loads must be connected between the individual inverters.

☐ For the AC cable connection to the Sunny Boy, only use the AC cable recommended by SMA Solar Technology AG (see Section 15 "Spare Parts and Accessories", page 72).

☐ To allow for greater distances between two inverters, use the AC field plug (see Section 6.4 "Assembling the AC Field Plug", page 33).

Procedure:

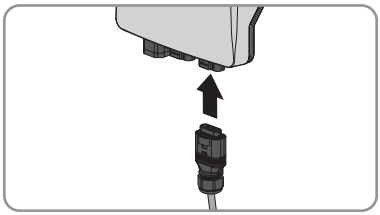
1. **⚠ DANGER**

   Danger to life due to electric shock

   Do not disconnect the AC connectors under load.

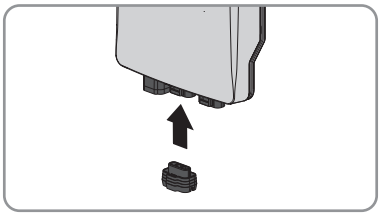
   - Ensure that the circuit breaker is switched off and that it cannot be reconnected.
   - Make sure that the PV modules are covered.

2. Plug one end of the supplied AC cable into the outer AC pin connector of the last inverter of the PV system.



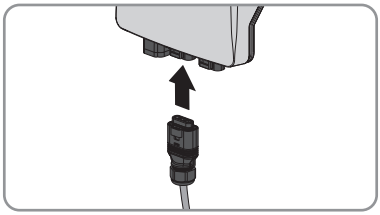
   ☑ The plug snaps into place.

3. Plug the protective cap into the middle AC pin connector of the last inverter.



   ☑ The protective cap snaps into place.

4. Seal the protective cap, if necessary. Make sure that the AC cable of the last inverter is plugged into the outer AC pin connector. Only the middle AC pin connector can be used for the security seal since it is the only one having eyelets for the security seal.
5. Ensure that the AC connector and the protective cap in the inverter pin connectors are securely in place.
6. Plug the other end of the AC cable into the middle AC pin connector of the next inverter.



   ☑ The plug snaps into place.

7. Connect further inverters following the same procedure.

8. If necessary, use AC field plugs to bridge greater distances (see Section 6.4 "Assembling the AC Field Plug", page 33).
9. If necessary, additionally ground the inverters (see Section 6.5 "Connecting Additional Grounding", page 36).
10. Connect the free end of the AC cable of the first inverter to the Sunny Multigate (see Section 6.6, page 36).

6.4 Assembling the AC Field Plug

You can use the AC field plugs included in the delivery for different purposes:

- Connecting the AC cable of the first inverter to the Sunny Multigate. However, this connection can also be made using a junction box.
- Using two AC field plugs to bridge greater distances between two inverters. The AC cables available at SMA Solar Technology AG for connecting the inverters have a limited length (see Section 15 "Spare Parts and Accessories", page 72).

Overview

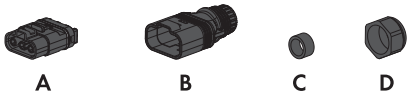


Figure 17: Elements of the AC field plug

Position	Designation
A	Insulator
B	Enclosure
C	Seal
D	Screw connection

Additionally required material (not included in the scope of delivery):

- ☐ Three bootlace ferrules: 2.5 mm²
- ☐ Cable shears: 165 mm
- ☐ Stripping knife with straight knife blade: 8 mm to 28 mm
- ☐ Insulation stripping tool: up to 10 mm²
- ☐ Crimping tool for bootlace ferrules: up to 10 mm²
- ☐ Torque screwdriver: 0.3 Nm to 1.2 Nm
- ☐ Cross-head screwdriver Pozidriv – bit, 1.4" or BiTorsion, 1/25 mm
- ☐ Torque wrench, scale adjustable, 2 Nm to 20 Nm
- ☐ Crow-Ring wrench, AF 25
- ☐ Square insertion tool, outer square: 3/8", inner square: 9 mm x 12 mm
- ☐ Screwdriver: insulated, blade width: 4 mm, blade thickness 0.8 mm

⚠ DANGER

Danger to life due to electric shock

- Do not disconnect or connect the AC field plug under load.
- Only assemble the AC field plug in a dry environment.
- Observe the operating temperature range of −40°C to +85°C.

Cable requirements:

☐ Cable cross-section: 2.5 mm²
☐ Temperature-resistant up to at least +90°C
☐ External diameter of the cable sheath: 9.6 mm to 10 mm
☐ Number of stranded wires: 46
☐ Cable type: copper wire, tin-plated
☐ Wire cross-section: 0.25 mm²

Removing and reassembling the AC field plug is only possible within 72 hours

- In total, the AC field plug may at maximum be removed three times and only within the first 72 hours after the first assembly.
- After the period of 72 hours has expired, the AC field plug must not be removed.
- The cable must be shortened again before each assembly.
- Only disconnect and disassemble the AC field plug following the instructions in this document (see Section 13.1 "Disconnecting the AC Field Plug", page 64).

Procedure:

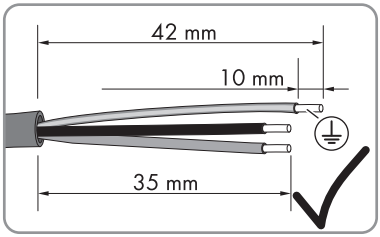
To assemble and connect the AC field plug, carry out the following steps in the given sequence. The exact procedure is described in the paragraphs below.

- Assembling the Cable
- Premounting the AC Field Plug
- Mounting the Insulator
- Completing Mounting of the AC Field Plug

Assembling the Cable

1. Shorten the cable to the desired length using cable shears.
2. Dismantle the cable by 42 mm using the stripping knife. Take care not to damage the individual insulated conductors.
3. Shorten L and N by 7 mm.

4. Using the insulation stripping tool, strip the insulation of the three individual conductors by 10 mm each (tolerance: ± 1 mm). Take care not to damage the individual stranded wires.



☑ The cable is assembled.

5. Push one bootlace ferrule onto each stripped insulated conductor up to the stop.
6. Crimp the bootlace ferrule tightly using a crimping tool.
7. Ensure that a crimping length of max. 2.4 mm is maintained.

Premounting the AC Field Plug

1. Slide the screw connection over the cable with the bootlace ferrules. Ensure that the thread of the screw connection is facing the bootlace ferrule.
2. Use your fingers to push the seal as far as possible into the plug enclosure.
3. Lead the plug enclosure with the seal over the cable. The thread must be facing the thread of the screw connection.

Mounting the Insulator

1. Push the stranded wires with the bootlace ferrules up to the stop in the premounted pin connectors inside the insulator. The line conductor must be plugged into pin connector **L**, the neutral conductor into pin connector **N** and the grounding conductor into the pin connector with the symbol ⏚ .

   ☑ The bootlace ferrules are no longer visible.
2. Tighten the three screws in the insulator using a screwdriver (torque: 0.8 Nm).
3. Make sure that the individual conductors are positioned securely in the correct pin connectors of the insulator.

Completing Mounting of the AC Field Plug

1. Push the plug enclosure onto the insulator.

   ☑ Both parts snap together. The catch mechanism on the insulator and on the plug enclosure must be correctly aligned.
2. Tighten the screw connection of the plug enclosure using a torque wrench and then tighten it with two different torques:
   - First tighten the screw connection with a torque of 3.3 Nm. Set the value 3.0 Nm at the scale of the torque wrench specified by SMA Solar Technology AG.
   - Then tighten the screw connection with a torque of 4.4 Nm. Set the value 4.0 Nm at the scale of the torque wrench specified by SMA Solar Technology AG.

- Hint: The given torque setting only applies to the torque wrench specified by SMA Solar Technology AG. The value to be set on the torque wrench is lower than the actual value (for more information on the calculation of the torque to be set, go to www.stahlwille.com). A torque wrench consists of the following components: torque wrench (basic device), square insertion tool and crow's foot wrench.

3. Make sure that the screw connection of the plug enclosure is securely fastened.

6.5 Connecting Additional Grounding

If a second grounding conductor or equipotential bonding is locally required, you can also ground the inverter enclosure. This prevents touch current if the original grounding conductor fails.

You can ground each inverter separately or connect several inverters with one another.

Procedure:

- Connect the grounding conductor to the equipotential bonding of the AC distribution board.

6.6 Connecting the First Inverter to the Sunny Multigate

6.6.1 Connecting the AC Cable to the AC Field Plug or to the Junction Box

There are two ways to connect the first inverter to the Sunny Multigate on the AC side:

- Connection with the AC field plug included in the delivery
- Connection via a junction box with integrated feed-through terminal

Cabling with AC Field Plug

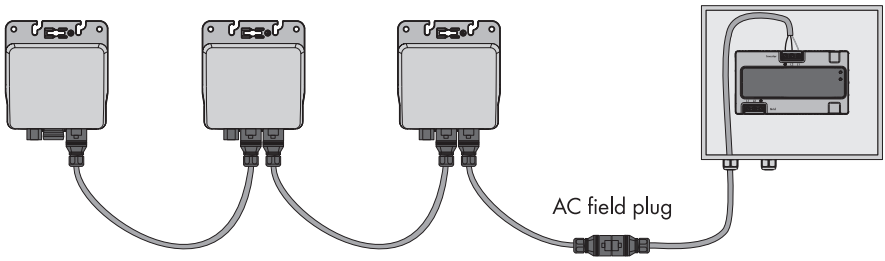


Figure 18: AC cabling of the entire PV system with AC field plug

Procedure:

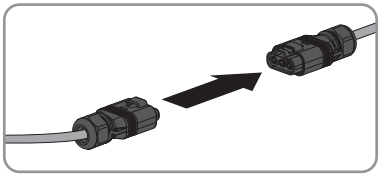
1. **⚠ DANGER**

   Danger to life due to electric shock

   Do not connect the AC field plug under load.

   - Make sure that the two-pole circuit breaker of the Sunny Multigate is switched off and cannot be reconnected.
   - Make sure that the PV modules are covered.

2. Assemble the AC field plug (see Section 6.4, page 33).
3. Plug the free end of the AC cable connected to the inverter into the pin connector of the assembled AC field plug.



☑ The AC field plug snaps into place. The catch mechanisms of both plugs must be correctly aligned.

Cabling with Junction Box

As an alternative to the AC field plug, you can use a junction box with feed-through terminal for the connection of the inverter AC cable to the Sunny Multigate. For the assembly and connection of the AC cable, follow the instructions of the junction box manufacturer.

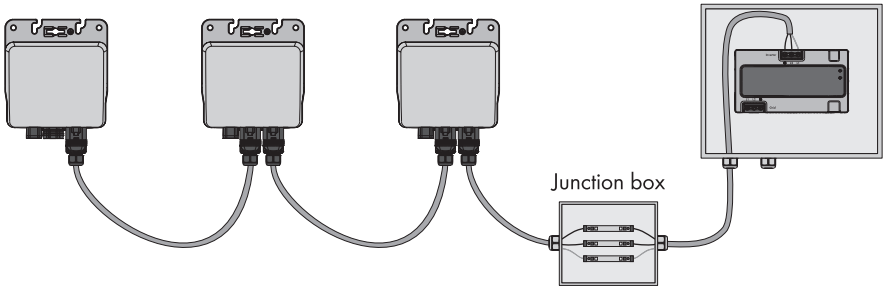


Figure 19: AC cabling of the entire PV system with junction box

Cable requirements:

☐ The same cable requirements that apply to the use of the AC field plug also have to be complied with in this case (see Section 6.4 "Assembling the AC Field Plug", page 33).

Procedure:

1. Cut off the free plug at the end of the AC cable of the inverter.
2. Assemble the AC cable and connect it to the junction box as described by the junction box manufacturer.

6.6.2 Connecting the AC Cable to Sunny Multigate

Connect the free end of the AC cable coming from the AC field plug or the junction box to the connecting terminal plate of the Sunny Multigate. The connecting terminal plate assigned for this is labeled **Inverter**.

Requirement:

☐ The Sunny Multigate must be correctly installed in the distribution box.

Cable requirements for use of AC field plug:

☐ When using the AC field plug, observe the cable requirements for assembling the AC field plug (see Section 6.6.1 "Connecting the AC Cable to the AC Field Plug or to the Junction Box", page 36)

Cable requirements for use of junction box:

☐ Cable cross-section: 2.5 mm²

☐ Temperature-resistant up to at least +90°C

☐ External diameter of the cable sheath: 9.6 mm to 10 mm

☐ Number of stranded wires: 46

☐ Cable type: copper wire, tin-plated

☐ Wire cross-section: 0.25 mm²

Installation of several Sunny Multigate devices

When installing several Sunny Multigate devices in a PV system, a three-wire cable with grounding conductor must be used for each Sunny Multigate in order to guarantee trouble-free communication between the Sunny Multigate and the inverter.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock

   - Ensure that the circuit breaker is switched off and that it cannot be reconnected.
   - Make sure that the PV modules are covered.

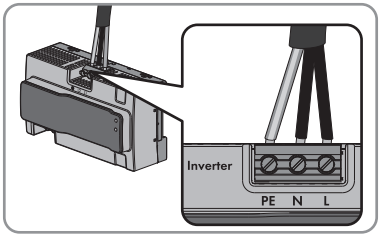
2. When using a junction box, assemble the AC cable and connect it to the junction box in accordance with the instructions of the manufacturer.
3. Route the AC cable from the AC field plug or the junction box to the terminal **Inverter** of the Sunny Multigate.
4. Dismantle the AC cable to the desired length.
5. Strip the insulation of the three AC cable conductors by 8 mm each.
6. ***NOTICE***

   Damage to the Sunny Multigate due to incorrectly connected conductors

   If **PE** and **L** or **N** are swapped, the Sunny Multigate could be damaged during commissioning.

   - Be sure to observe the terminal labels on the Sunny Multigate.
   - Connect all conductors in accordance with the terminal labels.
     - Connect the grounding conductor of the AC cable to the terminal **PE** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
     - Connect the line conductor of the AC cable to the terminal **L** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
     - Connect the neutral conductor of the AC cable to the terminal **N** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.

7. Tighten all three screws of the connecting terminal plate using a flat-blade screwdriver (torque: 0.6 Nm).
8. Make sure that all terminals are correctly allocated.



9. Make sure that all conductors are securely in place.

6.7 Connecting the Sunny Multigate to the Utility Grid

Connect the AC cable of the utility grid to the connecting terminal plate of the Sunny Multigate labeled **Grid** according to the following procedure:

Cable requirements:

- ☐ Only use copper cables.
- ☐ Use only cables made of solid wire or stranded wires.
- ☐ Temperature-resistant up to at least +90°C
- ☐ Conductor cross-section: 1.5 mm² to 6.0 mm²

Requirement:

- ☐ The Sunny Multigate must be correctly installed in the distribution box.
- ☐ If an external residual-current device is required, install a type A residual-current device which trips at a residual current of 100 mA or higher (for details on selecting a residual-current device, see the Technical Information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com).
- ☐ If the Sunny Multigate is being commissioned in Italy, an external grid and PV system protection (SPI) in accordance with the CEI 0-21 standard must additionally be installed.

Overvoltage category:

The Sunny Multigate can be deployed in utility grids of installation category III or lower, as defined in IEC 60664-1. This means that the Sunny Multigate can be permanently connected to the origin of an utility grid in a building. In installations involving long outdoor cable routes, additional measures for overvoltage suppression must be taken so that the overvoltage category is reduced from IV to III.

Procedure:

1. **⚠ DANGER**

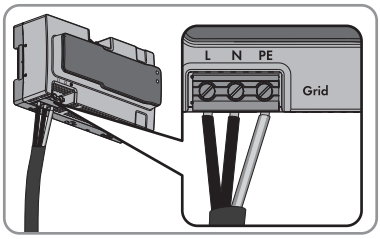
   Danger to life due to electric shock

   - Ensure that the circuit breaker is switched off and that it cannot be reconnected.

2. Route the AC cable of the utility grid through one opening at the bottom of the distribution box to the terminal **Grid** of the Sunny Multigate.
3. Dismantle the AC cable to the desired length.
4. Strip 8 mm insulation off each of the three conductors of the AC cable of the utility grid.
5. *NOTICE*

   Damage to the Sunny Multigate due to incorrectly connected conductors

   If **PE** and **L** or **N** are swapped, the Sunny Multigate could be damaged during commissioning.
   - Be sure to observe the terminal labels on the Sunny Multigate.
   - Connect all conductors in accordance with the terminal labels.
     - Connect the grounding conductor of the AC cable to the terminal **PE** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
     - Connect the line conductor of the AC cable to the terminal **L** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
     - Connect the neutral conductor of the AC cable to the terminal **N** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
6. Tighten all three screws of the connecting terminal plate using a flat-blade screwdriver (torque: 0.6 Nm).
7. Make sure that all terminals are correctly allocated.



8. Make sure that all conductors are securely in place.
9. Connect the grounding conductor of the Sunny Multigate to the equipotential bonding of the AC distribution board.

6.8 Connecting the PV Modules to the Inverters

Requirements:

☐ The PV modules must be correctly mounted in accordance with the manufacturer specifications.

☐ Each inverter must be connected to no more than one PV module.

☐ The thresholds for the input voltage and the input current of the inverter must be adhered to.

☐ The positive connection cable (DC+) of the PV module must be fitted with a positive DC connector suitable for the DC connector of the inverter.

☐ The negative connection cable (DC−) of the PV module must be fitted with a negative DC connector suitable for the DC connector of the inverter.

Procedure:

1. **⚠ DANGER**

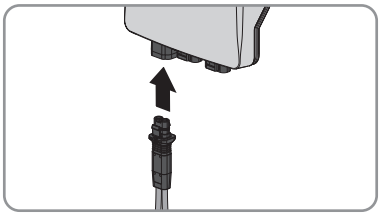
   Danger to life due to electric shock

   Do not disconnect the AC connector under load.

   - Ensure that the circuit breaker is switched off and that it cannot be reconnected.
   - Ensure that the PV module is covered.

2. Check the PV module for ground faults (see Section 11.2, page 61).
3. Check the DC connectors of the PV module for correct polarity and connect to the DC connectors of the supplied DC plug. Tip: for correct assignment, the DC plug is marked with + and –.

   ☑ The DC connectors snap into place.
4. Make sure that the DC connectors are securely in place.
5. Insert the DC plug with the DC connectors into the outer pin connector on the inverter.



7 Commissioning the PV System

Requirements:

- ☐ The Sunny Multigate must be correctly installed in the distribution box.
- ☐ The country data set must be configured according to the country or purpose. You can find the configured country data set on the enclosed supplementary sheet with the default settings.
- ☐ The AC cable of the utility grid must be correctly connected to the Sunny Multigate. All conductors must be connected in accordance with the terminal labels. No conductors must be swapped.
- ☐ The circuit breaker must be correctly rated.
- ☐ All inverters must be correctly mounted.
- ☐ All DC and AC connectors must be firmly plugged in.
- ☐ The connection areas of all inverters must be dry and sealed rain-tight by means of connectors and, where applicable, a protective cap.
- ☐ The unused AC pin connector on the last inverter of the PV system must be sealed with a protective cap.
- ☐ The first inverter of the PV system must be correctly connected to the Sunny Multigate via the AC cable. All conductors must be connected in accordance with the terminal labels. No conductors must be swapped.
- ☐ The PV modules must be correctly mounted.

NOTICE

Damage to the Sunny Multigate due to incorrectly connected conductors

If **PE** and **L** or **N** are swapped, the Sunny Multigate could be damaged during commissioning.

- Be sure to observe the terminal labels on the Sunny Multigate.
- All conductors must be connected in accordance with the terminal labels.
- Make sure that all terminals are correctly allocated.

Procedure:

- Switch on the circuit breaker.

☑ Both LEDs on the Sunny Multigate are glowing green. Feed-in operation begins.

✖ The LED **Inverter** is off?

There is a disturbance in the PV system.

- Eliminate the disturbance (see Section 11 "Troubleshooting", page 51). You will find the detailed error message in Sunny Portal or Sunny Explorer.

✖ The LED **Inverter** on the Sunny Multigate is glowing orange or red?

There is a disturbance in at least one of the connected inverters.

- Eliminate the disturbance (see Section 11 "Troubleshooting", page 51). You will find the detailed error message in Sunny Portal or Sunny Explorer.

✖ The LED **Multigate** on the Sunny Multigate is glowing orange or red?

There is a disturbance in the Sunny Multigate.

- Eliminate the disturbance (see Section 4.3 "LED Signals", page 16).

8 Configuration

8.1 Configuration Procedure

Once you have commissioned the PV system, you may have to adjust various settings via a communication product. This section describes the procedure for configuration and gives an overview of the steps you must perform in the prescribed order.

Procedure		See
1.	If you want to integrate the PV system into a Speedwire network, connect the Sunny Multigate to the network.	Section 8.2, page 44
2.	To manage the PV system data or to set the operating parameters, capture the Sunny Multigate in a communication product.	Section 8.3, page 45 and Section 8.4, page 46
3.	Change the PV system time and PV system password.	Manual of the communication product at www.SMA-Solar.com
4.	Check which country data set the Sunny Multigate is set to.	Supplementary sheet with default settings
5.	If the country data set is not set correctly for your country or your purpose, adjust to the required country data set.	Section 8.6, page 47

8.2 Connecting the Sunny Multigate to the Network

You can configure the Sunny Multigate and the inverters using an SMA communication product (e.g. Sunny Portal, Sunny Explorer).

In order to register your PV system in Sunny Portal, you must connect the Sunny Multigate to the local network.

Required material (not included in the scope of delivery):

☐ One network cable

Cable requirements:

The cable length and quality affect the quality of the signal. Observe the following cable requirements.

☐ Cable type: 100BaseTx
SMA Solar Technology AG recommends cable type "SMA COMCAB-OUTxxx" for outdoor use and cable type "SMA COMCAB-INxxx" for indoor use, available in lengths xxx = 100 m, 200 m, 500 m, 1,000 m

☐ Cable category: Cat5, Cat5e, Cat6, Cat6a or Cat7

☐ Plug type: RJ45 of Cat5, Cat5e, Cat6 or Cat6a

☐ Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP

☐ Number of insulated conductor pairs and insulated conductor cross-section: at least 2 x 2 x 0.22 mm²

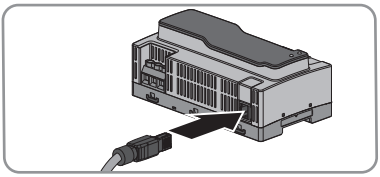
☐ Maximum cable length between two nodes when using patch cables: 50 m
☐ Maximum cable length between two nodes when using installation cables: 100 m
☐ UV-resistant for outdoor use

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning the PV System", page 42).
☐ A computer with an Ethernet interface must be available.

Procedure:

1. Connect one end of the network cable to the router or directly to the computer.
2. Plug the other end of the network cable into the pin connector at the bottom of the Sunny Multigate.



☑ The green LED in the pin connector is glowing or flashing. The Sunny Multigate is connected to the router or the computer.
☑ The green LED in the pin connector is glowing or flashing and the yellow LED is glowing: A 100 Mbit connection to the router or the computer is established.
✖ All LEDs in the pin connector are off.

Possible failure cause: the other end of the network cable is not correctly attached or there is no voltage supply.

- Make sure that the router or computer is supplied with voltage.
- Make sure that the network cable is correctly attached.
- If the network cable is correctly attached and the problem persists, contact the SMA Service Line (see Section 16 "Contact", page 74).

8.3 Registering the Sunny Multigate in Sunny Portal

If you want to use the Webconnect function and monitor your PV system in Sunny Portal, you must register the Sunny Multigate in Sunny Portal.

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning the PV System", page 42).
☐ The Sunny Multigate must be connected to a router or modem with Internet access and must be integrated in the local network. If the router or the modem does not support DHCP, or if DHCP is deactivated, you can use the SMA Connection Assist to integrate the Sunny Multigate into your network (see www.SMA-Solar.com).
☐ All UDP ports > 1024 on the router or modem must be open for outgoing connections. If there is a firewall installed on the router or modem, you might have to adjust the firewall rules.

- ☐ It must be possible for the outgoing router or modem connections to reach all Internet destinations (target IP, target port). If there is a firewall installed on the router or modem, you might have to adjust the firewall rules.
- ☐ On a router or modem with NAT (Network Address Translation) there must not be any port forwarding. Potential communication problems can thus be prevented.
- ☐ There must be no packet filtering and no manipulation for SIP packets on the router or modem.
- ☐ The registration ID (RID) and identification key (PIC) for registration in Sunny Portal must be available (see type label on the Sunny Multigate or enclosed label).

Procedure:

- Register the Sunny Multigate in Sunny Portal (see the User Manual "Micro Inverters in Sunny Portal" at www.SunnyPortal.com).
  Useful hint: The PV System Setup Assistant guides you through user registration and the registration of your PV system in Sunny Portal.

8.4 Connecting the Sunny Multigate to Sunny Explorer

Requirements:

- ☐ The PV system must be commissioned (see Section 7 "Commissioning the PV System", page 42).
- ☐ A computer with an Ethernet interface must be available.
- ☐ The Sunny Multigate must be connected to the network.
- ☐ Sunny Explorer from software version 1.06 must be installed on the computer.

Procedure:

- Start Sunny Explorer and create a PV system (see Sunny Explorer user manual at www.SMA-Solar.com).

8.5 Changing Operating Parameters

This section describes the basic procedure for changing operating parameters. Always change operating parameters as described in this section.

The operating parameters of the Sunny Multigate are set to certain values by default. You can change the operating parameters after commissioning using Sunny Explorer to optimize the operation of the inverter.

Requirements:

- ☐ The PV system must be commissioned (see Section 7 "Commissioning the PV System", page 42).
- ☐ A computer with an Ethernet interface must be available.
- ☐ Sunny Explorer from software version 1.06 must be installed on the computer.
- ☐ The system must be registered in Sunny Explorer.

☐ The changes to the grid-relevant parameters must be approved by the responsible grid operator.

☐ When changing grid-relevant parameters, the SMA Grid Guard code must be available (see the Certificate "Order Form for the SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Access the Sunny Explorer user interface.
2. If required, enter the SMA Grid Guard code.
3. Select and set the desired parameter.
4. Save settings.

8.6 Configuring the Country Data Set

By default, the Sunny Multigate is set to a specific country data set. You can find the country data set to which the Sunny Multigate has been set on the enclosed supplementary sheet with the default settings or on the type label. Each country data set contains various operating parameters, which can be individually set according to the respective country. You can change the parameters by means of a communication product.

The country data set must be set correctly.

If you select a country data set which is not valid for your country and purpose, it can cause a disturbance in the PV system and lead to problems with the grid operator. When selecting the country data set, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).

- If you are not sure which country data set is valid for your country or purpose, contact your grid operator for information on which country data set is to be configured.

The basic procedure for changing operating parameters is explained in another section (see Section 8.5 "Changing Operating Parameters", page 46).

Procedure:

- Select the parameter **Default** or **Set country standard** and adjust the required country data set.

8.7 Deactivating the Webconnect Function

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning the PV System", page 42).

☐ A computer with an Ethernet interface must be available.

☐ Sunny Explorer from software version 1.06 must be installed on the computer.

Procedure:

1. Access the Sunny Explorer user interface.
2. Under **Settings > External Communication**, select the parameter **Webconnect functionality switched on** and set to **No**.
3. Save settings.

9 Disconnecting the Inverter from Voltage Sources

Prior to performing any work on the inverter, always disconnect it from all voltage sources as described in this section. Always adhere to the prescribed sequence.

If you want to disconnect several inverters from voltage sources, you must repeat the following procedure for each inverter.

NOTICE

Damage to the inverter due to moisture ingress

When the inverter is open, moisture can penetrate and cause damage to the inverter. The tightness is no longer intact and the function of the inverter cannot be guaranteed.

- **Never** open the inverter.

Procedure:

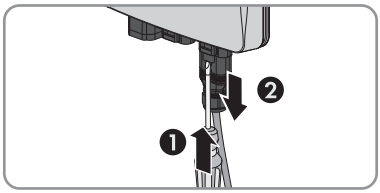
1. ⚠ DANGER

   Danger to life due to electric shock

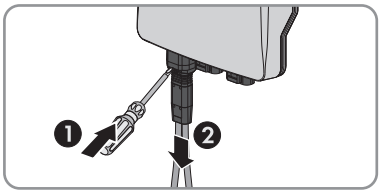
   Do not disconnect the AC connectors under load.

   - Disconnect the circuit breaker and secure it against reconnection.
   - Cover the PV modules.

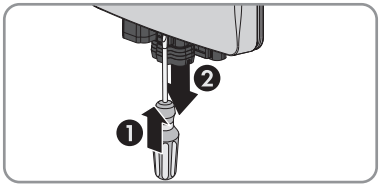
2. Release and remove all connected AC connectors from the inverter. Hook a flat-blade screwdriver (blade width: 4 mm) into the wide slot on the plug and lever it open. At the same time, pull out the AC connector without pulling the cable.



3. Remove the DC plug from the inverter. Do **not** pull on the DC cables.



4. To loosen the protective cap, remove the security seal, if necessary, and hook a flat-blade screwdriver (blade width: 4 mm) into the wide slot and and lever it open. At the same time, pull out the protective cap.



5. **⚠ DANGER**

Risk of electric shock due to high voltages

- Before carrying out any of the following work, wait five minutes for the capacitors to discharge.

10 Disconnecting the Sunny Multigate from Voltage Sources

⚠ DANGER

Risk of electric shock due to contact with live components when opening the Sunny Multigate

There are live components inside the Sunny Multigate. There is a risk of electric shock if you open the Sunny Multigate.

- **Never** open the Sunny Multigate.

Before working on the Sunny Multigate, always disconnect it from all voltage sources as described in this section.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock

   - Disconnect the circuit breaker and secure it against reconnection.
2. Ensure that no voltage is present between the conductors L and N at the AC terminal **Grid** using a suitable measuring device.
3. Ensure that no voltage is present between the conductor L and the grounding conductor at the AC terminal **Grid** using a suitable measuring device.
4. Ensure that no voltage is present between the conductors L and N at the AC terminal **Inverter** using a suitable measuring device.
5. Ensure that no voltage is present between the conductor L and the grounding conductor at the AC terminal **Inverter** using a suitable measuring device.

11 Troubleshooting

11.1 Error Messages

During operation of the PV system, events may occur which can refer to one or several inverters or the Sunny Multigate. Events can be information, warnings or errors. All events are displayed in the communication product you are using (e.g. Sunny Portal, Sunny Explorer). Sunny Explorer additionally displays the corresponding event number for each event.

Inverter

Event number	Event, cause and corrective measures
101	**Grid fault/Grid overvoltage (spot value) (101)** The grid voltage or grid impedance at the connection point is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the grid voltage at the connection point is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
102	**Grid fault / Grid overvoltage fast (102)** The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
202	**Grid fault / Grid undervoltage fast (202)** The utility grid has been disconnected, the AC cable is damaged or the grid voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid. **Corrective measures:** 1. Make sure that the circuit breaker is switched on. 2. Make sure that the AC cable is not damaged. 3. Make sure that the AC cable is correctly connected. 4. Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
301	**Grid fault / Voltage increase protection (301)** The grid voltage or grid impedance at the connection point is too high. The inverter has disconnected from the utility grid to comply with the power quality. **Corrective measures:** • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
401	**Grid fault / Island grid (401)** The inverter is no longer in grid parallel operation and has stopped feed-in operation for safety reasons. **Corrective measures:** • Check the grid connection for significant, short-term frequency fluctuations.

Event number	Event, cause and corrective measures
501	**Grid fault / Grid frequency disturbance (501)** The power frequency is not within the permissible range. The inverter has disconnected from the utility grid. **Corrective measures:** • If possible, check the power frequency and observe how often major fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the SMA Service Line.
1001	**Installation failure grid connection / L/N swapped (1001)** The conductors **L** and **N** are swapped or **PE** is not connected. **Corrective measures:** • Check whether the connecting terminal plates **Grid** and **Inverter** of the Sunny Multigate are correctly assigned. • If the connecting terminal plates **Grid** and **Inverter** are not correctly assigned, disconnect the Sunny Multigate from all voltage sources (see Section 10, page 50) and connect the conductors **L**, **N** and **PE** correctly. • Once the connecting terminal plates are correctly assigned, check whether the AC field plugs or junction boxes between the inverters and the Sunny Multigate are correctly assembled. – Disconnect the inverter from all voltage sources (see Section 9, page 48). – Check the assembling. If present, remove the AC field plug (see Section 13.1 "Disconnecting the AC Field Plug", page 64) and assemble it correctly (see Section 6.4 "Assembling the AC Field Plug", page 33). • If the connecting terminal plates **Grid** and **Inverter** of the Sunny Multigate are correctly assigned, the inverter is correctly connected, the AC field plugs or junction boxes used are correctly assembled and this message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
3401	**DC overvoltage / Overvoltage input A (SW) (3401)** The DC input voltage connected to the inverter is too high. This can destroy the inverter. **Corrective measures:** 1. Immediately disconnect the PV module from the inverter. 2. Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC connectors to the inverter. If the DC voltage is above the maximum input voltage of the inverter, ensure that the PV module has been correctly rated or contact the installer of the PV module. If this message is repeated frequently, contact the SMA Service Line.
3501	**Insulation resistance / Insulation failure (3501)** The inverter has detected a ground fault in the PV array. As long as the fault exists, the inverter will not feed in. **Corrective measures:** • Check the PV system for ground faults (see Section 11.2, page 61).
3902	**Waiting for DC start conditions / Generator voltage too low / Start conditions not met (3902)** The PV array voltage is too low. **Corrective measures:** 1. Wait for higher irradiation. 2. If necessary, remove snow or dirt from the PV modules.
3903	**Waiting for DC start conditions / Generator voltage too high / Start conditions not met (3903)** The PV array voltage is too high. **Corrective measures:** • Wait until the DC start conditions are met.
6002 to 6006	**Self diagnosis > Interference of device (6002, 6005, 6006)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
6305	**Self diagnosis > Interference of device (6305)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.

Event number	Event, cause and corrective measures
6402	**Self diagnosis / Overtemperature (6402)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
6406	**DC overcurrent / Overcurrent input A (HW) (6406)** The current at the module input of the inverter is too high. The inverter has interrupted the feed-in operation. **Corrective measures:** • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range and/or whether voltage jumps occur (e.g. by switching on and off large loads). If voltage jumps occur or the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
6415	**Self diagnosis > Interference of device (6305)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.

Event number	Event, cause and corrective measures
6450	**Self diagnosis / Energy transfer not possible / Interference device (6450)** The inverter cannot feed into the utility grid. Possible causes: grid voltage is too high; a PV module is defective, soiled or shaded; a cloudy or foggy day. **Corrective measures:** 1. Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. 2. Check whether the DC voltage is stable in a realistic range in accordance with the datasheet of the PV module and the assessment of the weather situation. Therefore, determine the voltage during inverter operation using a communication product. 3. Check whether the respective PV module is heavily soiled or shaded. Clean the PV module if soiled. 4. During a very cloudy or foggy day, wait for higher irradiation. 5. If none of the described causes is applicable and the message is still displayed, contact the SMA Service Line.
10265	**PLC communication impaired (10265)** The cause must be determined by the SMA Service Line. **Corrective measures:** 1. If several Sunny Multigate devices are installed in a system, check whether the AC cables from the inverters to the Sunny Multigate devices have been laid in separate channels. If the AC cables are not laid separately from each other, lay the AC cables from the inverter to the Sunny Multigate in separate locations. 2. If the problem persists, contact the SMA Service Line.

Sunny Multigate

Event number	Event, cause and corrective measures
101	**Grid fault / Grid monitoring spot value (101)** The grid voltage or grid impedance at the connection point is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the grid voltage at the connection point is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
102	**Grid fault / Grid overvoltage fast (102)** The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
202	**Grid fault / Grid undervoltage fast (202)** The utility grid has been disconnected, the AC cable is damaged or the grid voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid. **Corrective measures:** 1. Make sure that the circuit breaker is switched on. 2. Make sure that the AC cable is not damaged. 3. Make sure that the AC cable is correctly connected. 4. Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
301	**Grid fault / Voltage increase protection (301)** The grid voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid to comply with the power quality. **Corrective measures:** • Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range. If the grid voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
401	**Grid fault / Island grid (401)** The inverter is no longer in grid parallel operation and has stopped feed-in operation for safety reasons. **Corrective measures:** • Check the grid connection for significant, short-term frequency fluctuations.
501	**Grid fault / Grid frequency disturbance (501)** The power frequency is not within the permissible range. The inverter has disconnected from the utility grid. **Corrective measures:** • If possible, check the power frequency and observe how often major fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the SMA Service Line.

Event number	Event, cause and corrective measures
1001	**Installation failure grid connection / L/N swapped (1001)** The conductors **L** and **N** are swapped or **PE** is not connected. **Corrective measures:** • Check whether the connecting terminal plates **Grid** and **Inverter** of the Sunny Multigate are correctly assigned. • If the connecting terminal plates **Grid** and **Inverter** are not correctly assigned, disconnect the Sunny Multigate from all voltage sources (see Section 10, page 50) and connect the conductors **L**, **N** and **PE** correctly. • Once the connecting terminal plates are correctly assigned, check whether the AC field plugs or junction boxes between the inverters and the Sunny Multigate are correctly assembled. – Disconnect the inverter from all voltage sources (see Section 9, page 48). – Check the assembling. If present, remove the AC field plug (see Section 13.1 "Disconnecting the AC Field Plug", page 64) and assemble it correctly (see Section 6.4 "Assembling the AC Field Plug", page 33). • If the connecting terminal plates **Grid** and **Inverter** of the Sunny Multigate are correctly assigned, the inverter is correctly connected, the AC field plugs or junction boxes used are correctly assembled and this message is still displayed, contact the SMA Service Line.
6002	**Self diagnosis > Interference of device (6002)** The system data is defective. **Corrective measures:** • Download firmware update from www.SMA-Solar.com and install with Sunny Explorer. • If this message is still displayed, contact the SMA Service Line.
6415	**Self diagnosis > Interference of device (6415)** The reference voltage test failed. **Corrective measures:** • Disconnect the Sunny Multigate from voltage sources (see Section 10, page 50) and re-commission it (see Section 7, page 42). • If this message is still displayed, contact the SMA Service Line.
6702	**Interference device (6702)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.

Event number	Event, cause and corrective measures
7001	**Fault sensor interior temperature (7001)** The temperature sensor for the indoor temperature of the Sunny Multigate is defective. Feed-in operation will be interrupted. **Corrective measures:** • Contact the SMA Service Line.
7702	**Self diagnosis > Interference of device (7702)** A relay error has occurred. **Corrective measures:** • Disconnect the Sunny Multigate from voltage sources (see Section 10, page 50) and re-commission it (see Section 7, page 42). • If this message is still displayed, contact the SMA Service Line.
8101 to 8102	**Communication disturbed (8101, 8102)** An error has occurred in the internal communication. This can be caused by one of the following: Feed-in operation continues. **Corrective measures:** 1. If several Sunny Multigate devices are installed in a system, check whether the AC cables from the inverters to the Sunny Multigate devices have been laid in separate channels. If the AC cables are not laid separately from each other, lay the AC cables from the inverter to the Sunny Multigate in separate locations. 2. If the problem persists, contact the SMA Service Line.
8104	**Interference device (8104)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
9014	**Invalid device combination (9014)** The Sunny Multigate and the inverters cannot be operated in this combination. **Corrective measures:** 1. Contact the SMA Service Line and request the latest firmware update, if necessary.
9015	**Max. permitted number of inverters exceeded (9015)** The number of inverters connected exceeds the maximum number specified in the currently set standard. **Corrective measures:** • Reduce the number of inverters in the PV system until the maximum permissible number is reached (see the user manual of the communication product).

Event number	Event, cause and corrective measures
10221	**New device cannot be administered (10221)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
10259	**Inconsistent communication version (10259)** The communication version of an inverter is not supported or the device combination is invalid. **Corrective measures:** 1. Contact the SMA Service Line and request the latest firmware update, if necessary.
10265	**The device with serial number X has not been available for X day(s) (10265)** Communication with one or several inverters is no longer possible. **Corrective measures:** 1. Check cables and inverters for loose connectors or damage. 2. Check PV modules for soiling or damage. 3. If the problem persists, contact the SMA Service Line.
10267	**Loss of communication to one or several devices (10267)** Communication with one or several inverters is no longer possible. **Corrective measures:** 1. Check cables and inverters for loose connectors or damage. 2. Check PV modules for soiling or damage. 3. If the problem persists, contact the SMA Service Line.

11.2 Checking the PV System for Ground Faults

If the LED **Inverter** on the Sunny Multigate is glowing red, this may indicate a ground fault in the PV system. The electrical insulation between the PV system and ground is defective.

⚠ WARNING

Danger to life due to electric shock

In the event of a ground fault, high voltages can be present.

- **No** terminal of the PV module must be grounded.
- Only touch the cables of the PV modules on their insulation.
- Do not touch any parts of the framework or supports of the PV modules.
- Do not connect PV modules with ground faults to the inverter.

If the Sunny Multigate indicates a ground fault in the PV array, proceed as follows:

Procedure:

1. Make sure that **no** terminal of the PV module is grounded.
2. Use Sunny Portal or Sunny Explorer to determine which of the connected inverters has a ground fault (see user manual of the communication product at www.SMA-Solar.com).
3. **⚠ DANGER**

   Risk of electric shock due to high voltages

   - Disconnect the affected inverter from all voltage sources (see Section 9, page 48).
4. Measure voltages with a suitable measuring device.
   - Measure the voltages between the positive terminal and the ground potential.
   - Measure the voltages between the negative terminal and the ground potential.
   - Measure the voltages between the positive and negative terminals.

     If the following results are present at the same time, there is a ground fault in the PV system:
     - All measured voltages are stable.
     - The sum of the two voltages to ground potential is approximately equal to the voltage between the positive and negative terminals.
5. In case of a ground fault, solve the problem and recommission the inverter (see Section 12, page 63).
6. If there is no ground fault and the error persists, contact the SMA Service Line.

12 Recommissioning the Inverter

Requirements:

- ☐ All inverters must be correctly mounted.
- ☐ The PV modules must be correctly mounted.
- ☐ The circuit breaker must be correctly rated.
- ☐ The Sunny Multigate must be correctly installed in the industrial enclosure.
- ☐ The unused AC pin connector on the last inverter of the PV system must be sealed with a protective cap.
- ☐ The AC cable of the utility grid must be correctly connected to the Sunny Multigate. All conductors must be connected in accordance with the terminal labels. No conductors must be swapped.

Procedure:

1. Connect the AC cables to the inverters (see Section 6.3 "AC Cabling of the Inverters", page 31).
2. Connect the first inverter to the Sunny Multigate (see Section 6.6 "Connecting the First Inverter to the Sunny Multigate", page 36). All conductors must be connected in accordance with the terminal labels. No conductors must be swapped.
3. Connect the PV modules to the inverters (see Section 6.8 "Connecting the PV Modules to the Inverters", page 40).
4. Remove the cover of the PV modules.
5. Switch on the two-pole circuit breaker.
   - ☑ Both LEDs on the Sunny Multigate are glowing green. Feed-in operation begins.
   - ✖ The LED **Inverter** is off?

     There is a disturbance in the PV system.
     - Eliminate the disturbance (see Section 11 "Troubleshooting", page 51). You will find the detailed error message in Sunny Portal or Sunny Explorer.
   - ✖ The LED **Inverter** on the Sunny Multigate is glowing orange or red?

     There is a disturbance in at least one of the connected inverters.
     - Eliminate the disturbance (see Section 11 "Troubleshooting", page 51). You will find the detailed error message in Sunny Portal or Sunny Explorer.
   - ✖ The LED **Multigate** on the Sunny Multigate is glowing orange or red?

     There is a disturbance in the Sunny Multigate.
     - Eliminate the disturbance (see Section 4.3 "LED Signals", page 16).

13 Decommissioning

13.1 Disconnecting the AC Field Plug

Removing and reassembling the AC field plug is only possible within 72 hours

- In total, the AC field plug may at maximum be removed three times and only within the first 72 hours after the first assembly.
- After the period of 72 hours has expired, the AC field plug must not be removed.
- The cable must be shortened again before the assembling.

Procedure:

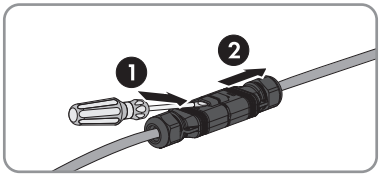
1. **⚠ DANGER**

   Danger to life due to electric shock

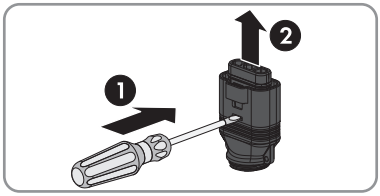
   Do not disconnect the AC field plug under load.

   - Ensure that the circuit breaker is switched off and that it cannot be reconnected.
   - Make sure that the PV modules are covered.

2. Unlock and remove the AC field plug from the connector of the inverter AC cable. Hook a flat-blade screwdriver (blade width: 4 mm) into the wide slot at the AC field plug and lever it open. At the same time, pull out the AC connector.



3. If necessary, disassemble the AC field plug:
   - Loosen the screw connection of the plug enclosure.
   - Remove the seal from the opening of the thread. Make sure not to damage the fins of the plug enclosure.
   - Detach the plug enclosure from the insulator. Insert a flat-blade screwdriver (blade width: 4 mm) into the small slot of the plug enclosure and unlock the fastening clamps until the insulator is detached from the plug enclosure.



   - Loosen all three screws using a screwdriver and remove the conductors.
   - Prior to reassembling the AC field plug, shorten the cable.
   - If necessary, reassemble the AC field plug (see Section 6.4 "Assembling the AC Field Plug", page 33).

13.2 Decommissioning the Inverter

1. **⚠ DANGER**

   Danger to life due to electric shock

   Do not disconnect the AC connectors under load.

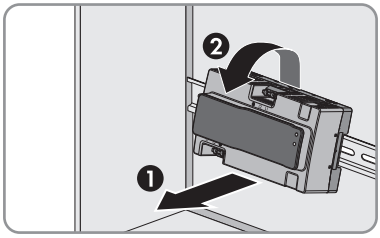
   - Disconnect the inverter from all voltage sources (see Section 9, page 48).
2. Release and remove all cables from the inverter.
3. Loosen all screws in the drill holes.
4. Remove the inverter from the wall or profile rail.
5. If the inverter is to be stored or shipped in packaging, pack the inverter, the DC connectors, and the AC connector. Use the original packaging or packaging that is suitable for the weight and dimensions of the inverter (see Section 14 "Technical Data", page 66).
6. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

13.3 Decommissioning the Sunny Multigate

1. **⚠ DANGER**

   Danger to life due to electric shock

   - Disconnect the Sunny Multigate from voltage sources (see Section 10, page 50).
2. Release the screw terminals on the Sunny Multigate using a flat-blade screwdriver (blade width: 3.5 mm).
3. Remove the conductors L and N from both connecting terminal plates.
4. If a network cable is connected, pull the network cable out of the pin connector.
5. Pull the grounding conductor out of both connecting terminal plates.
6. Disassemble the Sunny Multigate:
   - If mounted on a top-hat rail, detach the Sunny Multigate from the top-hat rail. Tilt the lower edge of the Sunny Multigate forwards and lift it up and off the top-hat rail.



   - If mounted on the brackets, release the screws with a flat-blade screwdriver (blade width: 3.5 mm) and remove the Sunny Multigate.
7. If the Sunny Multigate is to be stored or shipped, pack the Sunny Multigate and the AC connector. Use the original packaging or packaging suitable for the weight and size of the Sunny Multigate (see Section 14 "Technical Data", page 66).
8. If the Sunny Multigate is to be disposed of, dispose of the Sunny Multigate in accordance with the locally applicable disposal regulations for electronic waste.

14 Technical Data

14.1 Requirements for the PV Modules

Maximum DC power at standard test conditions (STC)	300 W
MPP voltage range at standard test conditions (STC)	26 V to 32 V
Maximum short-circuit current at standard test conditions (STC)	12 A

14.2 Sunny Boy 240

DC Input

Maximum number of connected PV modules per inverter	1
Maximum input voltage	45 V
MPP voltage range at 230 V	23.0 V to 39.0 V
Rated input voltage	29.5 V
Minimum input voltage	23.0 V
Minimum initial input voltage	23.0 V
Maximum initial input voltage	40 V
Maximum input current	8.5 A
Maximum short-circuit current per module*	12 A
Overvoltage category as per IEC 60664-1	II

* In accordance with IEC 62109-2: ISC PV

AC Output

Rated power at 230 V, 50 Hz	230 W
Maximum apparent AC power	230 VA
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range	184 V to 270 V
Nominal AC current at 220 V	1 A
Nominal AC current at 230 V	1 A
Nominal AC current at 240 V	0.96 A

Maximum output current	1 A
Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power	≤ 3%
Maximum residual output current	1 A
AC inrush current	123 mA
Rated power frequency	50 Hz
AC power frequency	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45.5 Hz to 63 Hz
Operating range at AC power frequency 60 Hz	45.5 Hz to 63 Hz
Power factor at rated power	1
Feed-in phases	1
Connection phases	1
Overvoltage category with Sunny Multigate as per IEC 60664-1	III

Protective Devices

DC reverse polarity protection	Short-circuit diode
Grid monitoring	SMA Grid Guard 5
AC short-circuit current capability	Available
Ground fault monitoring	Insulation monitoring
Galvanic isolation	Available

General Data

Width x height x depth, without connection area	188 mm x 199 mm x 43 mm
Width x height x depth, with connection area	188 mm x 218 mm x 43 mm
Weight	1.3 kg
Climatic category in accordance with IEC 60721-3-4	4K4H
Environmental category	outdoors
Pollution degree outside the enclosure	3
Pollution degree inside the enclosure	2
Operating temperature range	−40°C to +65°C
Maximum permissible value for relative humidity, non-condensing	100%

Maximum operating altitude above mean sea level	3,000 m
Noise emission, typical	≤ 38 dB(A)
Power loss in night mode	< 0.03 W
Topology	HF transformer
Cooling method	Convection
Degree of protection for electronics in accordance with IEC 60529	IP65
Protection class in accordance with IEC 61140	I
Grid configurations	TN-C grid configuration, TN-S grid configuration, TN-C-S grid configuration, Delta-IT *
Approvals and national standards As of June 2014**	VDE0126-1-1, VDE-AR-N-4105, VFR2014, PPC, EN 50438-CZ, NEN-EN 50438, EN 50438, C10/11/2012, AS 4777.3, RD1699, G83/2, CEI0-21, IEC 62109-2

* **Delta-IT:** When using in these networks, the grounding conductor monitoring must be deactivated and an additional grounding connected to the inverter.

** **IEC 62109-2:** This standard requires that the PV system is connected to Sunny Portal and that the fault alert is activated in Sunny Portal.

Climatic Conditions

As per IEC 60721-3-4, installation type C, class 4K4H

Extended temperature range	−40°C to +65°C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

As per IEC 60721-3-4, transport type E, class 2K3

Temperature range	−25°C to +70°C

Features

DC Connection	DC plug with DC connector*: DC plug, assembled, MC4 DC plug, assembled, Tyco

AC connection	AC cable with two connectors**
Powerline interface	As standard

* The DC connectors supplied are dependent on the order. You can find the SMA order numbers of the DC connectors in this document (see Section 15 "Spare Parts and Accessories", page 72).

** The length of the AC cable depends on the order and is either 1.40 m or 2.0 m.

Efficiency

Maximum efficiency, η_{max}	95.8%
European efficiency, η_{EU}	95.3%

14.3 Sunny Multigate

AC Input

Maximum number of connected micro inverters	12
Minimum number of connected micro inverters	1
Maximum input current	12 A

AC Output

Rated power at 230 V, 50 Hz	2,760 W
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range	184 V to 270 V
Nominal AC current at 220 V	12 A
Nominal AC current at 230 V	12 A
Nominal AC current at 240 V	11.5 A
Maximum output current	12 A
Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power	≤ 3%
Rated power frequency	50 Hz
AC power frequency	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45.5 Hz to 63 Hz
Operating range at AC power frequency 60 Hz	45.5 Hz to 63 Hz
Power factor at rated power	1
Feed-in phases	1

Connection phases	1
Overvoltage category as per IEC 60664-1	III

Protective Devices

Overvoltage protection	Varistors
Maximum permissible fuse protection	16 A

General Data

Width x height x depth, without connection area	162 mm x 90 mm x 68 mm
Weight	0.75 kg
Climatic category in accordance with IEC 60721-3-4	4K1
Environmental category	Not air-conditioned, indoors
Pollution degree outside the enclosure	3
Pollution degree inside the enclosure	2
Operating temperature range	−40°C to +45°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above mean sea level	3,000 m
Cooling method	Convection
Degree of protection for electronics in accordance with IEC 60529	IP20
Protection class in accordance with IEC 61140	I
Grid configurations	TN-C grid configuration, TN-S grid configuration, TN-C-S grid configuration, Delta-IT *
Approvals and national standards As of June 2014	VDE0126-1-1, VDE-AR-N-4105, VFR2014, PPC, EN 50438-CZ, NEN-EN 50438, EN 50438, C10/11/2012, AS 4777.3, RD1699, G83/2, CEI0-21, IEC 62109-2**

* **Delta-IT:** When using in these networks, the grounding conductor monitoring must be deactivated and an additional grounding connected to the inverter.

** **IEC 62109-2:** This standard requires that the PV system is connected to Sunny Portal and that the fault alert is activated in Sunny Portal.

Climatic Conditions

As per IEC 60721-3-4, installation type C, class 4K1

Extended temperature range	−40°C to +45°C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

As per IEC 60721-3-4, transport type E, class 2K3

Temperature range	−25°C to +70°C

Features

Power-line communication to inverters	As standard
Speedwire/Webconnect communication to SMA communication products, RJ45	As standard
Display of the PV system and communication status	2 LEDs

Torques

Screw terminals	0.6 Nm

Data Storage Capacity

Energy yield over the day per inverter	At least 63 days
Daily yields per inverter	At least 30 years
Event messages of the Sunny Multigate for users	At least 1,024 events
Event messages of the Sunny Multigate for installers	At least 1,024 events
Event messages per inverter for users	At least 256 events
Event messages per inverter for installers	At least 256 events

14.4 Torques of AC Field Plugs

Screw in insulator	0.8 Nm
Screw connection of the AC plug enclosure, initial torque	3.3 Nm
Screw connection of the AC plug enclosure, end torque	4.4 Nm

15 Spare Parts and Accessories

You will find the corresponding accessories and spare parts for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

Designation	Brief description	SMA order number
DC plug, assembled, MC4	24 DC plugs, assembled, Multi-Contact KST4	MI-DCMC4-10
DC plug, assembled, Tyco	24 DC plugs assembled with Tyco Solarlock	MI-DCTYCO-10
AC field plug	20 AC field plugs	MI-ACCON-10
AC protective cap	200 AC protective caps	MI-ACCAP-10
AC cable 1.40 m	24 AC cables with counterplugs for connecting the inverters among each other	MI-ACCAB14-10
AC cable 2.0 m	24 AC cables with counterplugs for connecting the inverters among each other	MI-ACCAB20-10
Bootlace ferrules 2.5 mm²	Manufacturer: Miromar LLC	Distributor: Ferrules Direct Order no. N25010
Cable shears	Insulated handles, 165 mm Manufacturer: KNIPEX	via distributor Art. no. 95 16 165
Stripping knife with straight knife blade	TiN 8 mm to 28 mm Manufacturer: JOKARI	via distributor Art. no. 728000
Insulation stripping tool	Cross-section up to 10 mm², insulation stripping length up to 25 mm Manufacturer: WEIDMÜLLER	via distributor Order no. 9005000000
Crimping tool	Square crimping tool for bootlace ferrules up to 10 mm² Manufacturer: RENNSTEIG	via distributor Art. no. 610 084 3
Torque screwdriver	1.4" hexagon socket, 0.3 Nm to 1.2 Nm Manufacturer: WERA	via distributor Art. no. 05074700001
Screwdriver bit	1.4" hexagon, length: 25 mm Application: cross-head screws Manufacturer: WERA	via distributor Art. no. 05056422001
Torque wrench	Adjustable by scale, Torque range: 2 Nm to 20 Nm Manufacturer: STAHLWILLE	via distributor Art. no. 50181002
Crow-Ring wrench, AF 25	Manufacturer: STAHLWILLE	via distributor Art. no. 02190025

Designation	Brief description	SMA order number
Square insertion tool	Outer square: 3/8" Inner square: 9 mm x 12 mm Manufacturer: STAHLWILLE	via distributor Art. no. 58240005 (734/5)
Screwdriver	Insulated, Blade width: 4 mm Blade thickness: 0.8 mm Manufacturer: WERA	via distributor Art. no. 05006115006

16 Contact

If you have technical problems with our products, contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Inverter device type
- Inverter serial number
- Device type of the Sunny Multigate
- Serial number of the Sunny Multigate
- Special country-specific settings of the Sunny Multigate (if applicable)
- Type and number of PV modules connected
- Message of the inverter or Sunny Multigate
- Optional equipment, e.g. communication products

Australia	SMA Australia Pty Ltd. Sydney	Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200
Belgien/Belgique/België	SMA Benelux BVBA/SPRL Mecheln	+32 15 286 730
Brasil	Vide España (Espanha)	
Česko	SMA Central & Eastern Europe s.r.o. Praha	+420 235 010 417
Chile	Ver España	
Danmark	Se Deutschland (Tyskland)	
Deutschland	SMA Solar Technology AG Niestetal	Medium Power Solutions Wechselrichter: +49 561 9522-1499 Kommunikation: +49 561 9522-2499 SMA Online Service Center: www.SMA.de/Service
		Hybrid Energy Solutions Sunny Island: +49 561 9522-399 PV-Diesel Hybridsysteme: +49 561 9522-3199
		Power Plant Solutions Sunny Central: +49 561 9522-299
España	SMA Ibérica Tecnología Solar, S.L.U. Barcelona	Llamada gratuita en España: 900 14 22 22 Internacional: +34 902 14 24 24

France	SMA France S.A.S. Lyon	Medium Power Solutions Onduleurs : +33 472 09 04 40 Communication : +33 472 09 04 41
		Hybrid Energy Solutions Sunny Island : +33 472 09 04 42
		Power Plant Solutions Sunny Central : +33 472 09 04 43
India	SMA Solar India Pvt. Ltd. Mumbai	+91 22 61713888
Italia	SMA Italia S.r.l. Milano	+39 02 8934-7299
Κύπρος/Kıbrıs	Βλέπε Ελλάδα/ Bkz. Ελλάδα (Yunanistan)	
Luxemburg/ Luxembourg	Siehe Belgien Voir Belgique	
Magyarország	lásd Česko (Csehország)	
Nederland	zie Belgien (België)	
Österreich	Siehe Deutschland	
Perú	Ver España	
Polska	Patrz Česko (Czechy)	
Portugal	SMA Solar Technology Portugal, Unipessoal Lda Lisboa	Gratuito em Portugal: 800 20 89 87 Internacional: +351 212377860
România	Vezi Česko (Cehia)	
Schweiz	Siehe Deutschland	
Slovensko	pozri Česko (Česká republika)	
South Africa	SMA Solar Technology South Africa Pty Ltd. Centurion (Pretoria)	08600 SUNNY (08600 78669) International: +27 (12) 643 1785
United Kingdom	SMA Solar UK Ltd. Milton Keynes	+44 1908 304899
Ελλάδα	SMA Hellas AE Αθήνα	801 222 9 222 International: +30 212 222 9 222
България	Вижте Ελλάδα (Гърция)	

ไทย	SMA Solar (Thailand) Co., Ltd. กรุงเทพฯ	+66 2 670 6999
대한민국	SMA Technology Korea Co., Ltd. 서울	+82-2-520-2666
+971 2 234-6177	SMA Middle East LLC أبو ظبي	الإمارات العربية المتحدة
Other countries	International SMA Service Line Niestetal	Toll free worldwide: 00800 SMA SERVICE (+800 762 7378423)

17 EC Declaration of Conformity

within the meaning of the EC directives

- 2004/108/EG (Electromagnetic compatibility, EMC)
- 2006/95/EG (Low voltage directive)

SMA Solar Technology AG confirms herewith that the inverters described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned directives. The entire EC Declaration of Conformity can be found at www.SMA-Solar.com.

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